Acorn Park
Cambridge, Massachusetts 02140
617 864-5770 Telex 921436

Arthur D. Little, Inc.

July 11, 1983

Dr. Julie Yang
Manager - Research Technologies
W.R. Grace & Co.
62 Whittmore Avenue
Cambridge, MA 02140

Dear Julie: C 76494

In accordance with your letter of July 1, 1983, we have analyzed a commercial sample of Monokote (Lot No. 2F1) taken from the job site of the ABC building at W. 66th Street, New York City and hand delivered by you for the presence and quantity of amphibole fibers. For this purpose, we have defined fiber as any particle with approximately parallel sides and with an aspect ratio of 3 or greater.

PROCEDURE

A "neat" sample was taken for optical microscopy. This sample was suspended in acetone, and four subsamples were taken for preparing slides - floaters, settled solids, suspended solids and a fiberous "lint". These were immersed in n_D = 1.640 oil and scanned at 100X under central stop dispersion staining conditions which would reveal a characteristic dark blue appearance for tremolite. Any particles having an approximate color match were individually examined at 500X for shape and index of refraction. Both sampling technique and area of observation were representative and characteristic of typical practice.

Secondly, we prepared a sample for electron microscopy by the wipe-out method. As you know, this is a very useful method for quickly preparing an unknown sample for component particle identification by transmission electron microscopy. A major drawback is that it is not quantitative and further, particles can be altered by selective fracturing during the wipeout. The as-received sample was dry sieved through a 35 mesh screen with a portion of the -35 fraction taken for analysis. The two fractions were then recombined and reserved. A pinch of the sample (670 µg) was worked with nitrocellulose in amyl acetate with a spatula on a glass slide and when shiny, was wiped with a clean

slide. After rewetting with a drop of solution, the second slide was wiped with a third to provide an appropriate "by eye" distribution. The film was floated off on prefiltered, distilled water, picked up on a screen holding electron microscope grids and the nitrocellulose was cleaned by the Jaffee wick method using acetone. For analysis, three pore openings each on two grids were examined at 10,000X and any particle meeting the fiber definition was measured (length and width) and analyzed by selected area electron diffraction (SAED). Photographs of several typical fibers and their SAED's were recorded.

RESULTS

For the optical microscopy analysis of the starting material, no fibers characteristic of tremolite were observed. The procedure employed is expected to have a detectability of 1 part per million (ppm).

For the electron microscopy analysis, a total of thirty fibers were observed. They are identified as follows:

Gypsum (morphology and SAED)	16
Probable gypsum (morphology alone)	6
Vermiculite (morphology and SAED)	2
Cubic mineral (morphology and SAED)	4
Probable cubic mineral (morphology alone)	2
	30

There was no evidence for amphibole fibers or in fact, any fibers that could even possibly be identified as amphiboles. The estimated detection limit for the sample concentration prepared and the area of sample analyzed is about 10 ppm.

In summary, examination of the supplied Monokote sample by optical and electron microscopy (using the wipe-out method) showed no evidence for the presence of amphibole fiber.

Very truly yours,

Edward T Peters

Edward T. Peters